MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF AERONAUTICS - STANDARD SPECIFICATION
F-160
Wire Fence With Wood Posts
(Class A Fence)

DESCRIPTION

1.1 This item covers the requirements for furnishing materials and constructing new wire fences and gates with wood posts in accordance with the details included herein and as shown on the plans. The class of fence to be erected shall be Class A, woven wire fencing surmounted by two strands of barbed wire, as indicated on the plans and in the bid proposal.

MATERIAL

2.1 Wire.

(a) Woven Wire. Woven wire fence shall be zinc or aluminum-coated, of the type, style and gauge shown on the plans. Zinc-coated wire shall conform to ASTM A116, Class 1. Aluminum-coated wire shall conform to ASTM A584, Class I.

(b) Barbed Wire. Barbed wire shall be 2-strand twisted steel of No. 12 ½ minimum wire gauge, with 4-point barbs of No. 14 minimum wire gauge at a nominal 5-inch spacing, and shall conform to one of the following types and specifications:

Type	Specification
(a) zinc-coated	ASTM A121, Class 1
(b) copper-covered	Fed. Spec. RR-F-221, Type 1, Style 3
(c) aluminum-coated	ASTM A585, Class 1

(c) Bracing Wire. Bracing wire shall be zinc or aluminum-coated steel, No. 9 wire gauge. Zinc-coated wire shall conform to ASTM A116, Class 1. Aluminum-coated wire shall conform to ASTM A584, Class 1.

2.2 Gates and Hardware. Gates, gate posts, and gate hardware shall be as specified under Item F-162, Chain Link Fences, unless otherwise detailed and specified on the plans.

2.3 Posts.

(a) Species. All posts shall be one of the following species of wood, unless otherwise noted in the proposal:

Group I	Group II
Cedar	Douglas-fir
Chestnut	Gum, Red
Cypress, Southern	Larch, Western
Locust, Black	Pine, Southern Yellow
Osage-orange	Pine, Lodgepole
Redwood	Tamarack
Yew, Pacific	Ash
Honey locust	Maple, Sugar
Oak, White	Oak, Red
Mulberry	Spruce
Line Oak	

Posts of Group I may be used untreated, provided at least 75% of the wood is heartwood. Posts of less than 75% heartwood of Group I shall be given a preservative treatment for the part of the post that will have contact with the ground line in accordance with the method specified under subparagraph (e)(1), below. Posts of Group II shall be given a preservative treatment in accordance with the method specified under subparagraph (e)(2), below.

(b) Quality. Posts shall be peeled, sound, straight-grained, free from decay, cracks, and splits; shakes shall not be in excess of 1/4 inch wide and 3 feet long. Checks (length-wise separations of the wood in a generally radial direction) are permitted, provided they are not injurious.

(c) Dimensions. All posts shall be of the length shown on the plans. Posts shall have the minimum top diameters shown on the plans or as specified. Sawed and split posts are acceptable in lieu of round posts provided their dimensions are such that round posts of required diameter could be turned therefrom.

(d) Manufacture. Outer bark shall be completely removed from all posts including depressions. Inner bark shall be removed from all post surfaces to be treated, except inner bark may remain in depression. The amount of wood shaved off in the removal of inner bark shall be held to a minimum.

(e) Treatment.

(1) Butt Treatment. All timber shall be thoroughly seasoned and dry (22% maximum moisture content) before applying preservative treatment. The

treatment shall be by a process at least equal to a hot and cold bath process. The hot bath temperature shall be from 200° to 230°F for a duration of 45 minutes, and the cold bath temperature not over 120°F for a duration of 45 minutes. The preservative shall be either coal-gas tar or coke-oven tar creosote conforming to American Wood Preservers Association (AWPA) Specification No. 4 for Grade 1 creosote; or a 5% minimum, by weight, pentachlorophenol petroleum solution made by either mixing a liquid concentrate of pentachlorophenol in fuel oil or kerosene, or by dissolving pentachlorophenol crystals of technical purity in suitable fuel oil solvents, as specified by AWPA.

(2) Full Length Treatment. Posts shall be conditioned and pressure treated in accordance with the requirements of ASTM D1760, Table 6.

2.4 Braces. Cleats, gate stops, and braces shall be of the size shown on the plans. They shall be of the same species and quality specified for the posts or approved by the Engineer, and they shall be free from knots larger than one third the width of the piece. Gate stops shall be made of posts of suitable length. Braces may be made of posts of suitable length of sawed lumber. All cleats, gate stops, and any braces in contact with the ground and for a distance of at least 6 inches above the ground shall be treated by the hot and cold bath process, specified herein for posts. The wire used in cable for bracing shall conform to F-160, 2.1(e).

2.5 Staples. The staples shall be No. 9 galvanized steel wire, 1 inch long for hardwood posts and 1 ½ inches long for use in softwood posts.

2.6 Concrete. Concrete shall be of a commercial grade with a minimum 28 day compressive strength of 2500 psi. Testing may be waived if either the concrete is furnished by a reputable transit mix firm approved by the Engineer, or the materials are approved by the Engineer when the concrete is mixed on the site.

When tests are waived, as heretofore mentioned, the concrete shall be a standard 6 bag mix, with 1" maximum course aggregate, unless otherwise specified, and shall have a slump range of 2-5 inches.

CONSTRUCTION METHODS

3.1 General. The fence shall be constructed in accordance with the details on the plans and as specified herein using new materials, and all work shall be performed in a workmanlike manner, satisfactory to the Engineer. Prior to the beginning of the work or upon the request of the Contractor, the Engineer shall locate the position of the work by establishing and marking the property line or fence line. When directed, the Contractor shall span the opening below the fence with barbed wire fastened to posts of extra length at locations of small natural swales or drainage ditches where it is not practical to conform the fence to the general contour of the ground surface. The new fence shall be permanently tied to the terminals of existing fences whenever required by the Engineer. The new fence shall be plumb, taut, true to line and ground contour, and complete in every detail. When directed, the Contractor shall stake down the woven wire fence at several points between posts.

When directed, in order to keep stock on adjoining property enclosed at all times, the Contractor shall arrange the work so that construction of the new fence will immediately follow the removal of existing fences. The length of unfenced section at any time shall not exceed 300 feet or such length that the stock can be kept in the proper field. The work will progress in this manner and at the close of the working day the newly constructed fence will be tied to the unremoved fence. Any openings in the fence will be guarded when stock is using the adjoining property.

3.2 Clearing Fence Line. The site of the fence will be sufficiently cleared of obstructions, and surface irregularities will be graded so that the fence will conform to the general contour of the ground. The fence line will be cleared to a minimum width of 5 feet on the outside and 10 feet on the airport side of the fence, or as specified on plans. This clearing will consist of the removal of all stumps, brush, rocks, trees, or other obstructions which will interfere with proper construction of the fence. Stumps within the cleared area of the fence line will be grubbed or excavated. The bottom of the fence will be placed a uniform distance above ground as specified in the plans. When shown on the plans or as directed by the Engineer, the existing fences which coincide with, or are in a position to interfere with, the new fence location will be removed by the Contractor as part of the construction work, unless such removal is listed as a separate item in the bid schedule. All holes remaining after post and stump removal will be refilled with suitable soil, gravel, or other material acceptable to the Engineer, and will be compacted properly with tampers.

The work will include the handling and disposal of all material cleared, of excess excavation and the removal of spoiled material regardless of the type, character, composition, or condition of such material encountered.

Clearing and grubbing of fence line will be incidental to the fence pay item.

3.3 Setting Posts. Posts will be set with large ends down, plumb, and in good line on the side on which the wire is to be fastened. Posts will be set full depth and will not be cut off to eliminate rock or other excavation. Where rock is encountered, it will be removed, even if blasting is necessary, to provide full-depth and full-size holes. The bottoms of all posts will be cut off square. The diameter of the holes will be at least 6 inches larger than the diameter of the posts. When cleats are used on posts, the holes will be dug large enough to accommodate them. After posts are placed and lined, the holes will be backfilled with suitable material which will be properly compacted by the use of tampers.

The posts adjacent to end, corner, anchor, and gate posts will be set and braced with braces and wire, as shown on the plans. No extra compensation will be made for rock excavation. Rock excavation will not be grounds for an extension of time.

3.4 Anchoring. Corner, end, gate and adjacent intermediate posts will be anchored, by gaining and spiking cleats to the sides of the posts, as indicated on the plans. No cleats will be required on other intermediate posts or on anchor posts.

3.5 Bracing. End, corner, anchor, and gate posts will be braced by using a post of sufficient length or a piece of sawed lumber of the proper size, together with a wire cable. The wooden brace will be gained and securely spiked into the end, corner, anchor, or gate posts and into the next intermediate posts about 6 inches from the top of the respective posts. A cable made of a double strand of galvanized soft wire will be looped around the end, corner, anchor, or gate post near the ground and around the next intermediate post about 12 inches from the top. After the cable has been stapled in this position, it will be twisted until tight. The staples used to hold the cable will be not less than 1-½ inches long. The tool used for twisting the cable will be left in place to permit later adjustment of bracing if found necessary. Anchor posts will be set at approximately 500-foot intervals and braced to the adjacent posts. Posts will be braced before the wire fencing is placed.

3.6 Installing Wire. The wire will be placed on the side of the posts away from the airport or as directed. The wire fence will be placed on the posts at the height indicated on the plans. Longitudinal wires will be installed parallel and drawn uniformly taut. The vertical stay wires of the woven wire fencing will be straight and vertical. At end and gate posts the woven wire and barbed wire will be wrapped once around the post; each longitudinal wire will be stapled at least three times and the ends of these wires will be tied with a snug, tight twist. Each longitudinal wire will be stapled to each intermediate post with one steel wire staple; at the corner and anchor posts, two or more staples will be used. The top strand of barbed wire of all fences will be stapled with two staples in each post. All staples will be set diagonally with the grain of the wood and driven up tight. After the fence has been erected, the tops of the wood posts will be sawed off with a 1-to-3 pitch. The bottom wire of the wire fencing will clear the ground by not more than 4 inches or less than 1 inch at any place.

3.7 Splicing Wire. Wire splices in longitudinal wires will be permitted if made with an approved galvanized bolt-clamp splice or a wire splice made as follows: The end of the wires will be carried 3 inches past the splice tool and wrapped around the other wire away from the tool for at least six turns in opposite directions. After the tool is removed, the space occupied by it will be closed by pulling the ends together. The unused ends of the wires will be cut close to make a neat, workmanlike job. Woven wire will be spliced only at posts.

3.8 Installing Gates. Gates will be installed as specified under Specification F-162, Chain Link Fences, unless otherwise detailed and specified on the plans.

3.9 Existing Fence Connections. Wherever the new fence joins an existing fence, either at a corner or at the intersection of straight fence lines, a corner or anchor post will be set at the junction and braced and anchored the same as herein described for corner posts.

If the connection is made at other than the corner of the new fence, the last span of the old fence will contain a brace span.

3.10 Warning Signs. Warning signs, when specified will be of suitably enameled metal, of the size, type, material, wording, and color specified on the plans.

3.11 Cleaning Up. The Contractor will remove from the vicinity of the completed work all tools, buildings, equipment, etc., used during construction.

METHOD OF MEASUREMENT

4.1 Fences, Class A (Wood Posts), will be measured in place from outside to outside of end posts or corner posts and will be the length of fence actually constructed, except for the space occupied by the gates.

Driveway gates and walkway gates will be measured in units for each gate installed and accepted.

BASIS OF PAYMENT

5.1 Payment will be made at the contract unit price per linear foot for Class A wire fence. This price will be full compensation for furnishing all materials and for all preparation, clearing and grubbing of fence line, erection, and installation of these materials, and for all labor, equipment, tools, and incidentals necessary to complete the item.

Payment will be made at the contract unit price per each for driveway or for walkway gates. This price will be full compensation for furnishing all materials and for all preparation, erection, and installation of these materials, and for all labor, equipment, tools, and incidentals necessary to complete the item.

Payment will be made under the nomenclature and seven digit item number specified in the plans and proposal for each type of fence, or specifically detailed gate required per linear foot or per each, as applicable.

The first three digits of any item number for work included under the specification will be 160, i.e., 160XXXX.

TESTING AND MATERIAL REQUIREMENTS

Test and Short Title

None

Material and Short Title

*RR-F-221	Wire
ASTM A116	Galvanized Wire Fence
ASTM A121	Galvanized Barbed Wire
ASTM A584	Aluminum-Coated
ASTM A595	Aluminum-Coated
ASTM D1760	Pressure Treatment
**AWPA No. 4	Preservative

NOTE: Others as required by referenced specifications.

*** Federal Specifications**
**** American Wood Preservers Association**